

**NATIONAL
SENIOR CERTIFICATE**

GRADE 12

**LIFE SCIENCES P1
PREPARATORY EXAMINATION 2008
MEMORANDUM**

MARKS: 150

TIME: 2½ hours

This memorandum consists of 10 pages.

SECTION A**QUESTION 1**

1.1

- 1.1.1 C ✓✓
 1.1.2 B ✓✓
 1.1.3 B ✓✓
 1.1.4 C ✓✓
 1.1.5 A ✓✓
 1.1.6 B ✓✓ (6 x 2) (12)

1.2

- 1.2.1 replication ✓
 1.2.2 chorion ✓
 1.2.3 nucleotide ✓
 1.2.4 chromosome ✓
 1.2.5 Down-syndrome ✓/Trisomy 21
 1.2.6 fruit ✓
 1.2.7 Double fertilization ✓ (7 x 1) (7)

1.3

- 1.3.1 B ✓
 1.3.2 F ✓
 1.3.3 A ✓
 1.3.4 I ✓
 1.3.5 C ✓ (5 x 1) (5)

1.4

- 1.4.1 2 : m-RNA ✓
 3 : t-RNA ✓ (2)
 1.4.2 CGT ✓ TGT ✓ AAA ✓ (3)
 1.4.3 4 : arginine ✓✓
 5 : cysteine ✓✓
 6 : lysine ✓✓ 3 x 2 (6)

1.5

- 1.5.1 A change in the nucleotide sequence of DNA/structure of a gene ✓ (1)
 1.5.2 $12\% + 0,5\% + 0,4\% + 0,1\% \checkmark = 13\% \checkmark$ (2)

- 1.5.3 Percentage of *Drosophila* flies with mutated sex-chromosomes, at different doses of radiation.

X-ray dose (arbitrary units)	Percentage of flies with sex-chromosome mutations
0	0
1 000	1
2 000	2
3 000	3
4 000	4
5 000	5

Mark allocation:

Caption✓	Dependent variable: left column✓	
Labelled columns✓	4 or 5 correct ✓✓	
Draw table ✓	1, 2 or 3 correct ✓	(6)

- 1.5.3 The higher the X-ray dosages ✓ the more mutations ✓ are present ✓ /direct proportional relationship✓✓ (2)

- 1.5.4 radioactivity in the air✓
cosmic rays from outer space✓
radiation from ground and buildings/food and drinks✓
nuclear fall-out✓
luminous watches✓
nuclear power station wastes✓ any 2 (2)

- 1.5.5 X-rays could cause mutations ✓ which could also influence the DNA of the gametes ✓ (spermatozoons and ova)/gametogenesis
Their children could have genetic defects ✓ any (2)
[15]

TOTAL QUESTION 1: 50

TOTAL SECTION A: 50

SECTION B

QUESTION 2

2.1

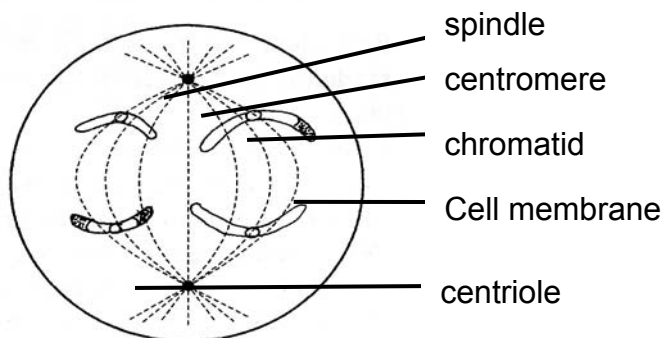
- 2.1.1 (a) Used to cut the insulin gene ✓ / used to cut the plasmid at specific point / used to splice the desirable gene into the vector (1)
 (b) It is cut open and used as a gene vector ✓ (1)
 (c) used to culture bacteria ✓ under optimal conditions/ under optimal pH, temperature and nutrient levels/ mass production (1)

2.1.2 protein synthesis ✓ (1)

2.1.3 (a) The supply of insulin was controlled by the demand for meat rather than the need for diabetics ✓ ✓ / kill more animals Some people were allergic to animal insulin ✓ ✓
 Any ONE disadvantage (2)

(b) It is pure human insulin/ contains no allergens ✓ ✓
 It could be produced on demand ✓ ✓
 Any ONE advantage (2)
[8]

2.2 Animal cell during Anaphase of Meiosis II ✓



Mark allocation:

- Caption 1
 Chromosomes drawn in chromatid form (separated) 1
 Correct phase (chromatide pulled towards poles) 1
 Correct number of chromatids 1
 Correct cell type (no cell wall) 1
 Any TWO labels 2 **[7]**

2.3

P₁ ✓ phenotype Brown x blue
genotype Bb x bb

Meiosis

G B; b ✓ x b ✓

Fertilization

F₁ ✓ Genotype Bb and bb ✓
Phenotype Brown ✓ and blue ✓

gametes	B	b
b	Bb	bb
b	Bb	bb

OR

2 marks for correct gametes

(7)

2.4

2.4.1 Decide on the size of the sample ✓
Design a table to record the findings ✓
Common understanding off attached and unattached earlobe ✓
Logistics (time, duties of each member of the group) ✓
(Mark first TWO only) (2)

2.4.2 200 ✓ (1)

2.4.3 Accept the hypothesis ✓ / Hypothesis is not rejected (1)

2.4.4 140 girls have unattached earlobes ✓ which is more than the 80 boys ✓ (2)

2.4.5 Bigger sample ✓ ✓ / more schools / learners / community (2)
(Mark first ONE only)

[8]

TOTAL QUESTION 2 : 30

QUESTION 3

3.1

3.1.1 testosterone ✓ (1)

3.1.2 Stimulates the development of primary male sex organs ✓/
Penis and testes
Stimulates the development of secondary male characteristics ✓/
growth of body hair/muscle development/ deep voice (2)

3.1.3 (a) 46 chromosome ✓
(b) 23 chromosome ✓ (2)

3.1.4 During prophase 1, as a result of chiasmata, crossing over ✓
of segments of chromatids occurs between homologous
chromosomes. This lead to new combinations of genes ✓ on
the chromosomes of the sperm cells.

During metaphase 1, the bivalents line up at the equator of the spindle
independently ✓ of other bivalents. This increases the potential
variation in the sperm cells because it leads to different combinations
of chromosomes ✓ in the sperm cells. Max (3)

[8]

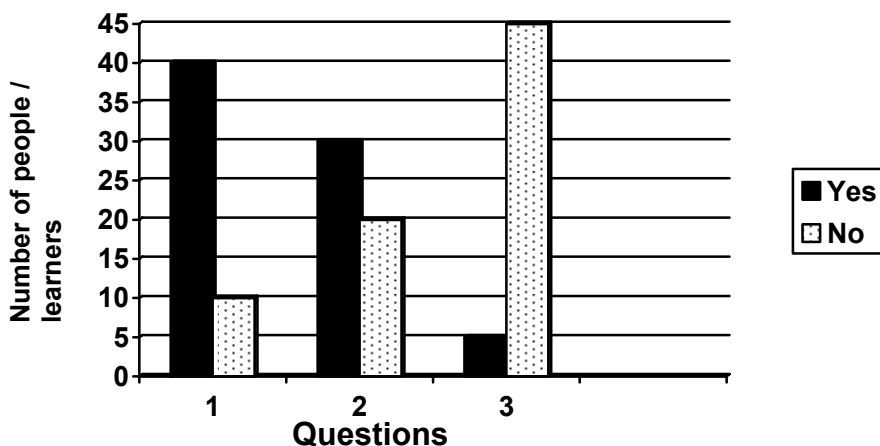
- 3.2 1. X^HY ✓✓
2. X^HX^h ✓✓
3. X^hY ✓✓
4. X^HX^h ✓ and X^HX^H ✓ (8)

3.3

3.3.1 50 learners ✓ (1)

3.3.2

Results of survey on people`s attitudes and beliefs about albinism ✓



Rubric for the mark allocation of the graph+

Correct type graph	1
Caption of graph	1
X-axis: Correct label and width of bars	1
Y-as: Correct label and appropriate scale	1
Plotting of bars	1: 1-2 bars drawn correctly
	2: 3-4 bars drawn correctly
	3: 5-6 bars drawn correctly

Note:

If the wrong type of graph is drawn, marks will be lost for “correct type of graph”, as well as for drawing of the bars. If graphs are not drawn on the same system of axes, mark the first graph only using the given criteria. (7)

- 3.3.3 (1) The majority of high school learners (80%) have a misconception of the cause ✓ of this disorder. They blame only the mother, although the condition also have a paternal origin ✓ / have to have two recessive genes from both parents for this disorder to manifest itself.
- (2) 60% of the learners that took part in the survey ✓, believe that albinism is a shame to a family which should be hidden from society ✓
- (3) A large majority of the learners (90%) indicated that they would not employ an albino ✓ Their attitude are evidence of misconceptions about the cause of albinism and the abilities of albinos ✓

(6)
[14]

TOTAL QUESTION 3: 30

TOTAL SECTION B: 60

SECTION C**QUESTION 4**

4.1

4.1.1 Day 13/14 ✓ (1)

4.1.2 1 ✓ °C ✓ (2)

4.1.3 Variables should be controlled ✓ for more accurate results ✓ / more reliable/more scientifically correct results (2)

4.1.4 (a) Josephine ✓; basal body temperature stayed high after ovulation. ✓ (2)

(b) The woman measure her basal body temperature daily and looks for changes at the time of ovulation ✓
The couple avoid intercourse during the fertile period, which is four days before and after ovulation ✓ (2)(c) Basal body temperature could change ✓ because of illness ✓
(Mark first answer only) (2)

4.1.5 (a) Day 6 ✓ and day 17 ✓ (accept 6 or 7 and 17 or 18) (2)

(b) 32 ✓ arbitrary units ✓ (accept 32 to 33) (2)

(c) The progesterone level ✓ stays high ✓ (2)

[17]4.2.1 A : Placenta ✓
B : Umbilical cord ✓
D : Vagina ✓ (3)4.2.2 Support and protect embryo from mechanical shock ✓
Allow foetus to move in a pond free from the effects of gravity and pressure ✓
Prevents large scale changes in the temperature of the foetus ✓
(Mark first TWO only) (2)

4.2.3 Amniocentesis ✓ (1)

4.2.4 Contraction of the muscular wall of the uterus pushes the foetus out ✓ and the placenta and umbilical cord ✓ / after birth (2)

[8]

4.3.1 Possible reasons for adoption:

- The biological mother of the child cannot afford milk, nappies, medicine, food ✓ for the baby; adoption by other parents will provide the basic needs for the child ✓
- Emotional care and support for the baby ✓ will be better with the new parents than the biological mother ✓, because she experience financial insecurity
- In the long term educational opportunities ✓ could be better planned to ensure a prosperous future for the child ✓
- The adoption process is legal and regulated ✓ to ensure that new parents and biological parents` cultures are compatible ✓
- Adoption into a stable home will improve the quality of life for the adopted child ✓ This is beneficial to ensure a stable long term relationships and better job opportunities ✓
- Adoption of a child could improve the lives ✓ of childless couples ✓

Any other acceptable reason Any 4 x 2 (8)

OR

Possible reasons against adoption:

- Both biological mother and child will experience emotional trauma ✓ and separation anxiety ✓
- Adopting parents might not have the same cultural, language, life style levels ✓ and bonding might be negatively affected.
- The attitudes of the community towards adoption may be negative ✓; the child might develop a negative self-esteem ✓
- By raising her own child, the biological mother might find new reasons for living ✓ and improving the quality of life for both of them ✓
- By breast-feeding ✓ and nurturing her baby, the biological mother improves the health of the baby ✓

Any other acceptable reason Any 4 x 2 (8)

4.3.2 Consequence:

Child could be born with foetal alcohol syndrome ✓/FAS (1)

Symptoms

- Mental retardation ✓
- Microcephaly (small head/brain). ✓
- Behavioural problems such as hyperactivity and poor concentration ✓
- Reduced growth rate, continuing after birth ✓
- Poor muscle tone ✓
- Flat face ✓ (poorly developed cheek bones) /long thin upper lip/
Short upturned nose/ sometimes a cleft palate Any 3 (3)

[12]**Synthesis**

Description	Marks
Not attempted	0
Significant gaps in the logic and flow of the answer	1
Minor gaps in the logic and flow of the answer	2
Well structured – demonstrates insight and understanding	3

(3)

[15]**TOTAL QUESTION 4: 40****TOTAL SECTION C: 40****GRAND TOTAL: 150**